



SLOVENSKI STANDARD

SIST ETS 300 684:1998

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Radijska oprema in sistemi (RES) - Standard elektromagnetne združljivosti (EMC) komercialno dostopne amaterske radijske opreme

Radio Equipment and Systems (RES); ElectroMagnetic Compatibility (EMC) standard for commercially available amateur radio equipment

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33.100.01	Elektromagnetna združljivost na splošno	Electromagnetic compatibility in general

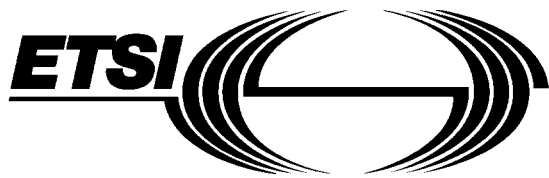
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Foreword

This European Telecommunication Standard (ETS) has been produced by the Radio Equipment and Systems (RES) Technical Committee of the European Telecommunications Standards Institute (ETSI) in response to European Commission mandate [BC-T-353].

This ETS is intended to become a Harmonized EMC Standard, the reference of which is intended to be published in the Official Journal of the European Commission referencing the EMC Directive, 89/336/EEC.

Conformity to the Harmonized Standard will confer presumption of compliance with the essential requirements of the EMC Directive.

The technical specifications, which are relevant to the EMC Directive are listed in annex A.

This ETS is based upon the Generic Standards EN 50081-1 [1] and EN 50082-1 [2], and other standards where appropriate, to meet the essential requirements of the Council Directive 89/336/EEC [3].

Transposition dates	
Date of adoption	20 December 1996
Date of latest announcement of this ETS (doa):	30 April 1997
Date of latest publication of new National Standard or endorsement of this ETS (dop/e):	31 October 1997
Date of withdrawal of any conflicting National Standard (dow):	31 October 1997

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1 Scope

This European Telecommunications Standard (ETS) covers the assessment of radio communication and ancillary equipment in respect of ElectroMagnetic Compatibility (EMC).

This ETS specifies the applicable EMC tests, the methods of measurement, the limits and the minimum performance criteria for radio equipment intended to be used by radio amateurs within the meaning of article 1, definition 53 of the Radio Regulations in the International Telecommunications Convention and which is available commercially.

This ETS applies to amateur radio equipment either manufactured commercially as ready-to-use equipment or as modules or as components having an intrinsic functionality.

The environment classifications used in this ETS refers to the environment classification used in the generic standards EN 50081-1 [1], EN 50082-1 [2], except the vehicular environment class which refers to ISO 7637 [13], [14].

The EMC requirements have been selected to ensure an adequate level of compatibility for apparatus in residential, commercial, light industrial and vehicular environments. The levels however, do not cover extreme cases which may occur in any location but with a low probability of occurrence.

This ETS may not cover those cases where a potential source of interference which is producing individually repeated transient phenomena or a continuous phenomena is permanently present, e.g. a radar or broadcast site in the near vicinity. In such a case it may be necessary to use special protection applied to either the source of interference or the interfered part or both.

Compliance of radio equipment with the requirements of this ETS does not signify compliance to any requirements related to the use of the equipment (for example, licensing requirements).

Compliance to this ETS does not signify compliance to any safety requirements. However, it is the responsibility of the assessor of the equipment that any observation regarding the equipment becoming dangerous or unsafe as a result of the application of the tests of this ETS, should be properly documented.

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2 Normative references

This ETS incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

- | | |
|-----|--|
| [1] | EN 50081-1: "Electromagnetic compatibility - Generic emission standard - Part 1: Residential, commercial and light industry". |
| [2] | EN 50082-1: "Electromagnetic compatibility - Generic immunity standard - Part 1: Residential, commercial and light industry". |
| [3] | 89/336/EEC: "Council Directive on the approximation of the laws of the Member States relating to electromagnetic compatibility". |
| [4] | ITU Radio Regulations 1 - 18. |
| [5] | EN 55022: "Limits and methods of measurement of radio disturbance characteristics of information technology equipment". |
| [6] | CISPR 16-1: "Specification for radio disturbance and immunity measuring apparatus and methods - Part 1: Radio disturbance and immunity measuring apparatus". |
| [7] | ENV 50140: "Electromagnetic Compatibility - Basic immunity standard - Radiated, radio-frequency electromagnetic field. Immunity test". |

- [8] IEC 1000-4-2: "Electromagnetic Compatibility (EMC); Part 4: Testing and measurements techniques - Section 2: Electrostatic discharge immunity test. Basic EMC publication".
- [9] IEC 1000-4-4: "Electromagnetic Compatibility (EMC); Part 4: Testing and measurements techniques - Section 4: Electrical fast transient/burst immunity test. Basic EMC publication".
- [10] EN 61000-4-6: "Electromagnetic Compatibility (EMC); Part 4: Testing and measurements techniques - Section 6: Immunity to conducted disturbances, induced by radio-frequency fields".
- [11] EN 61000-4-11: "Electromagnetic Compatibility (EMC); Part 4: Testing and measurements techniques - Section 11: Voltage dips, short interruptions and voltage variations immunity tests - Basic EMC publication".
- [12] ENV 50142: "Electromagnetic Compatibility - Basic immunity standard. Surge immunity test".
- [13] ISO 7637: "Road vehicles - Electrical disturbance by conducting and coupling - Part 1: Passenger cars and light commercial vehicles with nominal 12 V supply voltage - Electrical transient conduction along supply lines only".
- [14] ISO 7637: "Road vehicles - Electrical disturbance by conducting and coupling - Part 2: Commercial vehicles with nominal 24 V supply voltage - Electrical transient conduction along supply lines only".
- [15] EN 50147: "Anechoic chambers - Part 2: Alternative test site suitability with respect to site attenuation".

3 Definitions, abbreviations and symbols

3.1 Definitions

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For the purposes of this ETS, the following definitions apply:

base station equipment: Used to describe amateur radio equipment which is powered from the public AC power network, either directly or indirectly to an AC/DC converter.

integral antenna: An antenna designed to be connected to the equipment without the use of an external connector and considered to be part of the equipment. An integral antenna may be fitted internally or externally to the equipment.

Manufacturer (SUPPLIER): The legal entity responsible under the terms of the Council Directive 89/336/EEC [3], for placing the product on the market in an EU member state.

maximum usable sensitivity: Minimum receiver Radio Frequency (RF) input signal level to produce a specified analogue SINAD ratio or Bit Error Ratio (BER), or other specified output quality measure, which is input signal level related.

mobile equipment: Used to describe all amateur radio equipment powered by a vehicular power supply.

spurious emissions: Emissions on a frequency or frequencies which are outside the necessary bandwidth and the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions, intermodulation products and frequency conversion products, but exclude out-of-band emissions.

out-of-band emissions: Emissions on a frequency or frequencies immediately outside the necessary bandwidth which results from the modulation process, but excluding spurious emissions.

unwanted emission: Consists of spurious emissions and out-of-band emissions.

port: A particular interface of the specified apparatus with the external electromagnetic environment. Any connection point to an equipment intended for connection of cables to or from that equipment is considered as a port (see figure 1).

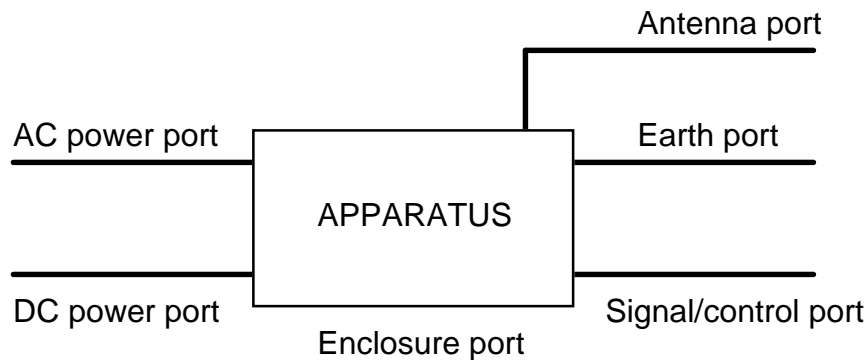


Figure 1: Examples of ports

enclosure port: The physical boundary of the apparatus through which electromagnetic fields may radiate or impinge.

portable equipment: Used to describe all portable amateur radio equipment powered by an internal (and/or) external battery.

NOTE 1: More than one of the equipment classifications may apply to certain equipment as described in subclause 5.2 depending upon the manufacturer's declaration of normal intended use.

ancillary equipment: Equipment (apparatus) used in connection with a receiver, transmitter or transceiver is considered as an ancillary equipment (apparatus) if:

- the equipment is intended for use in conjunction with a receiver, transmitter or transceiver to provide additional operational and/or control features to the radio equipment (e.g. to extend control to another position or location); and
- the equipment cannot be used on a stand alone basis to provide user functions independently of a receiver, transmitter or transceiver; and
- the receiver, transmitter or transceiver to which it is connected, is capable of providing some intended operation such as transmitting and/or receiving without the ancillary equipment. (i.e. it is not a sub unit of the main equipment essential to the main equipment's basic functions).

support equipment: This is equipment that can be used with the EUT, but which has functionality when used alone. Modems and/or PC connections are also to be regarded as support equipment, and not as ancillary equipment.

NOTE 2: The philosophy depends on the manufacturer. It is up to him to declare, for example, his power supply unit as an integral part of his radio equipment or as a stand-alone item which would be declared compliant separately. Typical examples of ancillary equipment include: microphones, loudspeakers, morse keys (manual or automatic/electronic), desktop 'drop-in' battery chargers for hand-held portables. Remote front-panels may be considered as ancillary equipment only if the radio has an integral, permanent front panel as well. Otherwise, demountable front-panels should be considered as an integral part of the EUT. Embedded PCB assemblies sold as options, which increase or change the EUT functionality, are regarded as integral to the EUT and not as ancillary equipment. Snap-on battery packs are also integral parts of the EUT and not ancillary equipment. Plug-in or screw-on whip antennas are regarded as integral parts of the EUT and not ancillary equipment, even if the interface is a 50 Ω connector.

3.2 Abbreviations

For the purposes of this ETS, the following abbreviations apply:

BER	Bit Error Ratio
DSB-SC	Double SideBand Suppressed Carrier
EMC	ElectroMagnetic Compatibility
emf	electromotive force
ESD	ElectroStatic Discharge
EUT	Equipment Under Test
LISN	Line Impedance Stabilizing Network
PEP	Peak Envelope Power
RF	Radio Frequency
SSB	Single SideBand

3.3 Symbols

For the purposes of this ETS, the following symbols apply:

F _b	skirt bandwidth
F _c	centre frequency of the transmitter necessary bandwidth
F _n	necessary bandwidth
HF	High Frequency
SINAD	Ratio of Signal + Noise + Distortion to Noise + Distortion
VHF	Very High Frequency
UHF	Ultra High Frequency

4 Test conditions

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4.1 Test conditions: general (standards.iteh.ai)

This subclause defines the requirements for the general test configuration and are as follows:

- the equipment shall be tested under conditions which are within the manufacturer's declared range of humidity, temperature and supply voltage;
- the test configuration shall be as close as possible to normal intended use;
- where portable (handheld) equipment is provided with a detachable integral antenna, it shall be tested with the antenna fitted in a manner typical of normal intended use, unless specified otherwise in this ETS;
- if the equipment with an integral antenna provides an internal antenna connector for testing purposes, the tests can be made via the terminal;
- if the equipment is part of a system, or can be connected to ancillary equipment, then it shall be acceptable to test the equipment while connected to the minimum configuration of ancillary equipment necessary to exercise the ports;
- ports, which in normal operation are connected, shall be connected to an ancillary equipment or to a representative piece of cable correctly terminated to simulate the impedance of the ancillary equipment. RF input/output ports shall be correctly terminated;
- if the equipment has a large number of ports, then a sufficient number shall be selected to simulate the actual operating conditions and to ensure that all different types of termination are tested;
- ports which are not connected to cables during normal intended operation, e.g. service connectors, programming connectors, temporary connectors etc. shall not be connected to any cables for the purpose of EMC testing. Where cables have to be connected to these ports, or interconnecting cables have to be extended in length in order to exercise the EUT, precautions shall be taken to ensure that the evaluation of the EUT is not affected by the addition or extension of these cables;

- the tests shall be carried out at a point within the specified normal operating environmental range at the rated supply voltage for the equipment;
- the test conditions, test configurations modes of operation and the test methods used shall be properly documented.

The manufacturer shall recommend a power supply for use with the equipment under test (EUT), to ensure satisfactory operation of the combination during EMC testing. In the event that a range of power supply units can be used with several of that manufacturer's radios, then each power supply unit shall be tested with the radio having the highest RF output Peak Envelope Power (PEP). These power supply units shall then be listed as preferred items for future generations of that manufacturer's radios.

4.1.1 EUT test frequencies

Testing shall be performed with the EUT set to frequencies as follows:

- single-band equipment: test at the centre of the band;
- double-band equipment: test at the centre of both bands;
- HF multi-band equipment or VHF/UHF multi-band equipment: test at the centre of the lowest, the centre of the middle, and the centre of the highest band;
- HF/VHF, HF/UHF or HF/VHF/UHF combined equipment: test at the centre of the lowest HF band, the centre of the middle HF band, the centre of the highest HF band, the centre of the lowest VHF/UHF band, the centre of the middle VHF/UHF band, and the centre of the highest VHF/UHF band.

4.2 Test conditions: Immunity testing

In the case of receivers operating, or capable of operating on a number of frequencies over a wide frequency band, immunity tests shall be made over a selected number of wanted signal test frequencies. For the selected wanted signal test frequencies, see subclause 4.1.1.

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A communications link shall be established at the start of the test and maintained during the test. The test modulation, test arrangement etc., as specified in this ETS, subclauses 4.2.1, 4.2.2, 4.2.3, 4.2.4 and 4.2.5 shall apply and the conditions shall be as follows:

- for transmitter immunity testing under active conditions, in the case of transmitters designed to emit transmissions with a non constant envelope, the power setting may be reduced to -6 dB with respect to maximum PEP RF output. In the case of transmitters designed to emit transmissions with a constant envelope, the EUT may be operated at maximum PEP RF output, or at a level up to 6 dB lower than this in the event of declared thermal limitations;
- for stand alone receivers or receivers of transceivers operating in the simplex mode, the wanted RF input signal, coupled to the receiver, shall be modulated with a suitable test signal (see subclause 4.2.3);
- for duplex transceivers, the wanted RF input signal, coupled to the receiver, shall be modulated with a suitable test signal (see subclause 4.2.3). The transmitter shall be operated at its maximum PEP RF output, modulated with the test signal, coupled to the transmitter from the output of the receiver (repeater mode).

4.2.1 Arrangements for wanted signals at the modulation input of the transmitter

The transmitter should be modulated with a suitable signal, from an internal or external signal source. If it is not appropriate to provide a modulated signal from the transmitter, the test may be performed using an unmodulated carrier. It shall be possible to verify that a communications link is established and maintained.